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Signed Andrew Gersey

Dated 22 July 2004

PRIORITY DOCUMENT
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THE PATENT OFFICE
M
29 MAY 2004
NEWPORT

01JUN04 E900074-1 825508
P01/7700 0.00-0412114.1 NONE

Your reference
206B

29 MAY 2004

0412114.1

Notes
Please type, or write in dark ink using CAPITAL letters. A prescribed fee is payable for a request for grant of a patent. For details, please contact the Patent Office (telephone 071–438 4700).

Rule 16 of the Patents Rules 1990 is the main rule governing the completion and filing of this form.

The Patent Office

Request for grant of a Patent

Form 1/77

Patents Act 1977

❶ Title of invention

1 Please give the title of the invention: APPARATUS AND METHOD FOR HEATING FLUIDS

❷ Applicant's details

❑ **First or only applicant**

2a If you are applying as a corporate body please give:

Corporate name

Country *(and State of incorporation, if appropriate)*

2b If you are applying as an individual or one of a partnership please give in full:

Surname: THOMA

Forenames: CHRISTIAN HERMUT

2c **In all cases**, please give the following details:

Address: CHALET ABACO
GREEN ROAD
ST. CLEMENT
JERSEY

UK postcode *(if applicable)*: JE 2 6QA

Country

ADP number *(if known)*: 12398400 1

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Forenames

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❸ *An address for service in the United Kingdom must be supplied*

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❸ Address for service details

3a Have you appointed an agent to deal with your application?

Yes ☐ No ☑ ***go to 3b***

↓ ***please give details below***

Agent's name

Agent's address

Postcode

Agent's ADP number

3b: *If you have appointed an agent, all correspondence concerning your application will be sent to the agent's United Kingdom address.*

3b If you have not appointed an agent please give a name and address in the United Kingdom to which all correspondence will be sent:

Name c/o Steff THOMA

Address Hawthorns
Sandpit Lane
Penn Bucks

Postcode HP10 8HD Daytime telephone number *(if available)* 01534 - 878241

ADP number *(if known)* 8666406001

❹ Reference number

4 Agent's or applicant's reference number *(if applicable)* 206B

❺ Claiming an earlier application date

5 Are you claiming that this application be treated as having been filed on the date of filing of an earlier application?

Please mark correct box

Yes ☐ No ☐ ➡ ***go to 6***

↓ ***please give details below***

☐ number of earlier application or patent number

☐ filing date

(day month year)

☐ and the Section of the Patents Act 1977 under which you are claiming:

Please mark correct box

15(4) (Divisional) ☐ 8(3) ☐ 12(6) ☐ 37(4) ☐

❻ Declaration of priority

❻ If you are declaring priority from a PCT Application please enter 'PCT' as the country and enter the country code (for example, GB) as part of the application number.

Please give the date in all number format, for example, 31/05/90 for 31 May 1990.

6 If you are declaring priority from previous application(s), please give:

Country of filing	Priority application number *(if known)*	Filing date *(day, month, year)*

❼ *The answer must be 'No' if:*
- *any applicant is not an inventor*
- *there is an inventor who is not an applicant, or*
- *any applicant is a corporate body.*

❼ Inventorship

7 Are you (the applicant or applicants) the sole inventor or the joint inventors?

Please mark correct box

Yes [✓] No [ ] ➡ ***A Statement of Inventorship on Patents Form 7/77 will need to be filed (see Rule 15).***

❽ *Please supply duplicates of claim(s), abstract, description and drawing(s).*

❽ Checklist

8a Please fill in the number of sheets for each of the following types of document contained in this application.

Continuation sheets for this Patents Form 1/77			0
Claim(s)	0	Description	4 ✓
Abstract	0	Drawing(s)	3 + 3 ✓

8b Which of the following documents also accompanies the application?

Please mark correct box(es)

Priority documents *(please state how many)*	0
Translation(s) of Priority documents *(please state how many)*	0
Patents Form 7/77 – Statement of Inventorship and Right to Grant *(please state how many)*	0
Patents Form 9/77 – Preliminary Examination/Search	0
Patents Form 10/77 – Request for Substantive Examination	0

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❾ Request

I/We request the grant of a patent on the basis of this application.

Please sign here ➡

Signed [signature] Date 27 (day) MAY (month) 2004 (year)

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APPARATUS AND METHOD FOR HEATING FLUIDS

Certain improvements have been discovered which are here described and follow on the Apparatus and Method for Heating Fluids filed on July 4th, 2003 as Patent Application GB 0315576.9.

Figure 24 is a longitudinal sectional view of the heat generating device of Fig. 1. according to a fifth embodiment of the present invention, deploying a one-piece rotor and shaft component with axial feed port and internal intake passages.

Figure 25 is a longitudinal sectional view of the heat generating device of Fig. 24 with the modification in respect of the rotating unit of having a fluid throttle orifice disposed at the entrance to the fluid intake passageway.

Figure 26 is a longitudinal sectional view of the heat generating device of Fig. 24 with the modification in respect of the rotating unit of having one or more angled passageways in the interior of the rotating unit.

Figure 27 is a longitudinal sectional view of the heat generating device of Fig. 26 with the modification in respect of the rotating unit of having one or more fluid throttle orifices disposed in the interior of the rotating unit and communicating with one or more holes in the first row of holes

Figure 28 is a longitudinal sectional view of the heat generating device of Fig. 1. according to a sixth embodiment of the present invention, deploying a two-piece rotor and shaft component, where an axial feed port opening to a longitudinal passageway is arranged to be connected with more than one row of holes opening on the periphery of the rotor, via directly or via a fluid throttle orifice.

Detailed Description of the Fifth Illustrative Embodiment of the Invention

As this embodiment of the present invention, depicted in Fig. 24, has a rotating component 200 having an entrance port 201 leading to internal longitudinal passageway 202. Passageway 202 connects with one or more radial passageways 205 which direct the fluid, entering at intake 10iv to the exterior peripheral surface 206 that lies radially inwards of bore 207. Once fluid entering this annular clearance at the point where the radial passageways 205 open 210 on peripheral surface 206, the fluid travels across a series of rows of holes denoted by reference numerals 211, 212, 213 before exiting the device in a heated condition at threaded exit connection 214. The realtively cold fluid entering at axial port 201 picks up heat from the rotating component 200 during its transit to opening 210 on peripheral surface 206, thereby pre-heating the fluid.

As compared to Fig. 24, Fig. 25 incorporates a fluid throttle 218 at the inner end 219 of rotating unit 220, the throttle has a relatively small central hole which acts as an orifice to slow down the flow rate of fluid from inlet 10iv to the longitudinal passageway 222.

As compared to Fig. 24, Fig. 26 has at least one inclined passageway 230 connecting with longitudinal passageway 237 on the one hand, and opening at 231 in the volume space between wall 235 of housing 2 and face 236 of the rotating component 234. The relatively cold fluid entering the device at inlet 10iv near axial port 238 flows through the passageways 237, 230 before being redirected at opening 231 to flow radially outwardly in the volume space between wall 235 and face 236 to reach annular clearance where a number of holes 240 are positioned along the exterior surface of the rotating unit 234. The heated fluid exits the device at threaded exit connection 214.

As compared to Fig. 24, Fig. 27 shows a pair of fluid throttle 250, 251 disposed in the rotating unit 252. The rotating component 252 has an entrance port 253 leading to internal longitudinal passageway 254. Passageway 254 connects with radial passageways 255, 256 to communicate via respective throttles 250, 251 with holes 260, 261 of the first array of holes in the rotating unit.

Detailed Description of the Sixth Illustrative Embodiment of the Invention

In this embodiment of the present invention, depicted in Fig. 28, the rotating component comprises a rotor sleeve portion 270 fixed to a drive shaft portion 271, preferably by a heat-shrink fit.

The exterior of the rotor sleeve 270 is shown having a conical male exterior surface 272 and surrounding sleeve housing member 275 is provided with a complimentary opposing female conical surface 176.

However, it should be noted that either or both rotor sleeve 270 and sleeve housing member 275 may be cylindrical.

As shown, there are fours rows comprising a series of openings or depression zones, here in the formed of drilled holes such as holes denoted by reference numerals 280, 281, 282, 283. By way of example, all such holes 280-283 shown lying about rotational axis 290 are connected by respective smaller holes 290, 291, 292, 293 to longitudinal pasageway 295. By way of further example, the holes shown lying below the rotational axis are connected to longitudinal passageway via a respective throttle, shown for example as throttle 296.

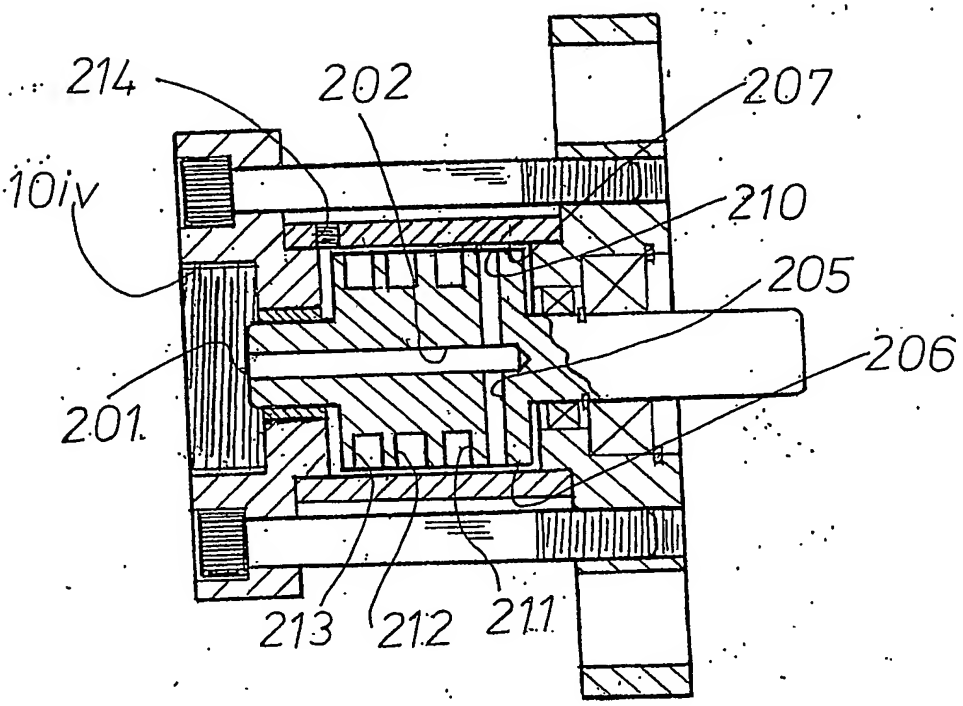
214
202
207
10iv
210
205
206
201
213
212
211

FIG. 24

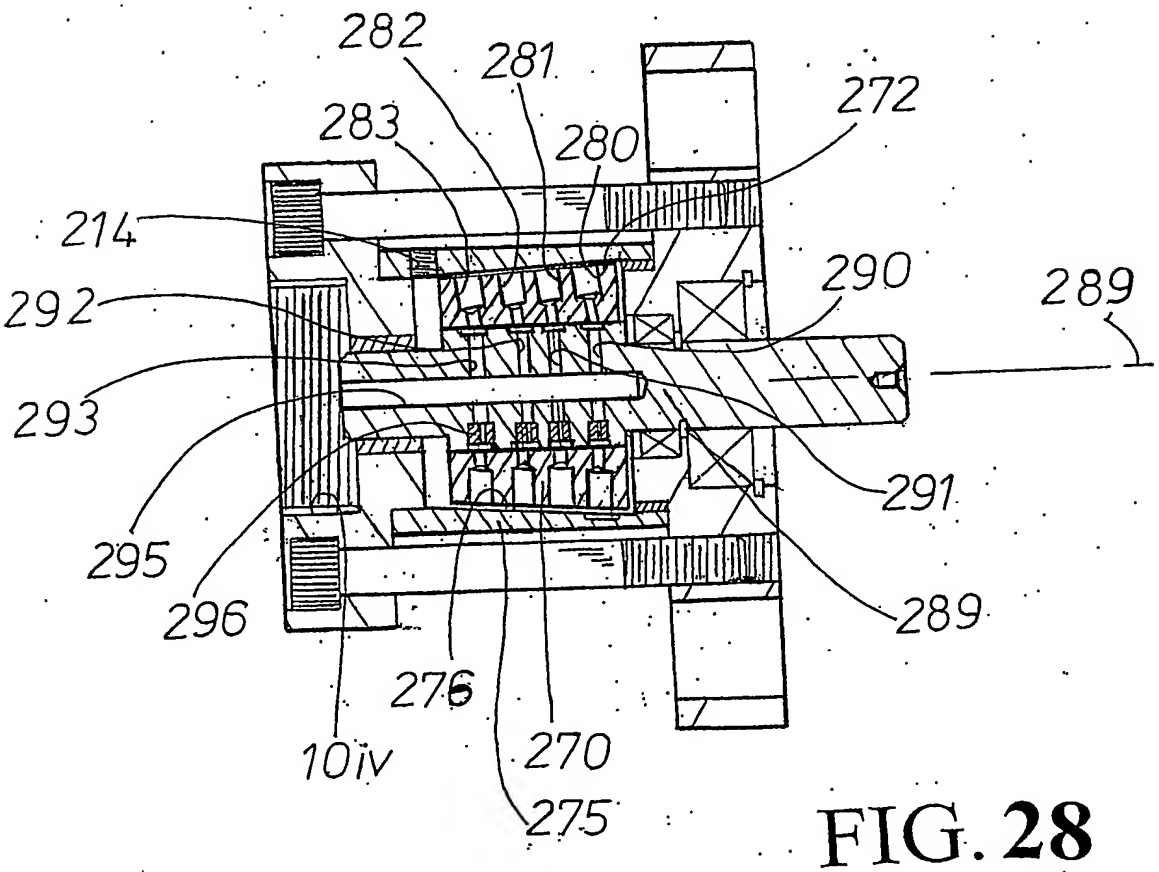
282
281
272
283
280
214
290
289
292
293
291
295
296
289
276
10iv
270
275

FIG. 28

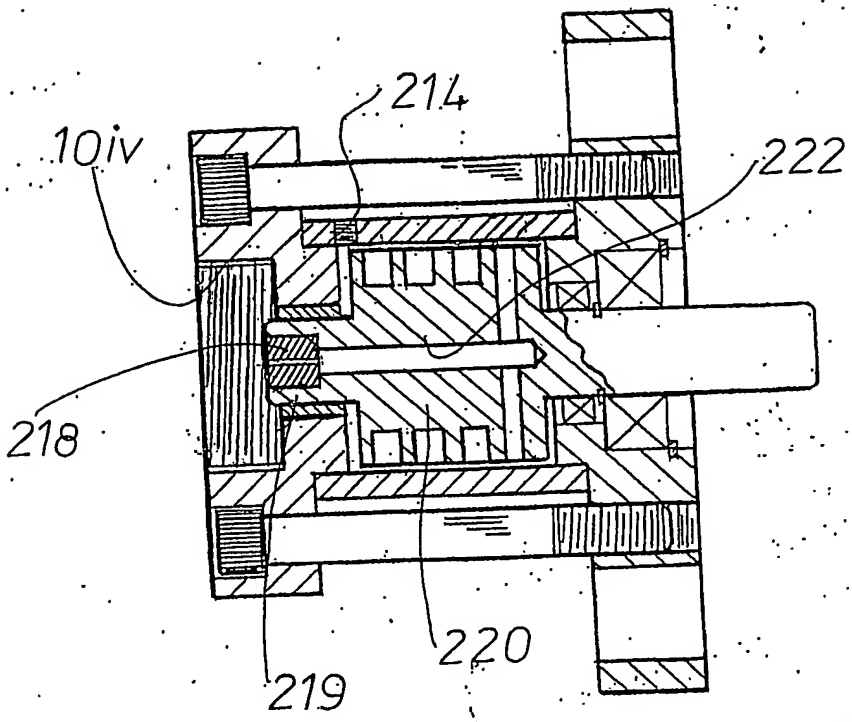

FIG. 25

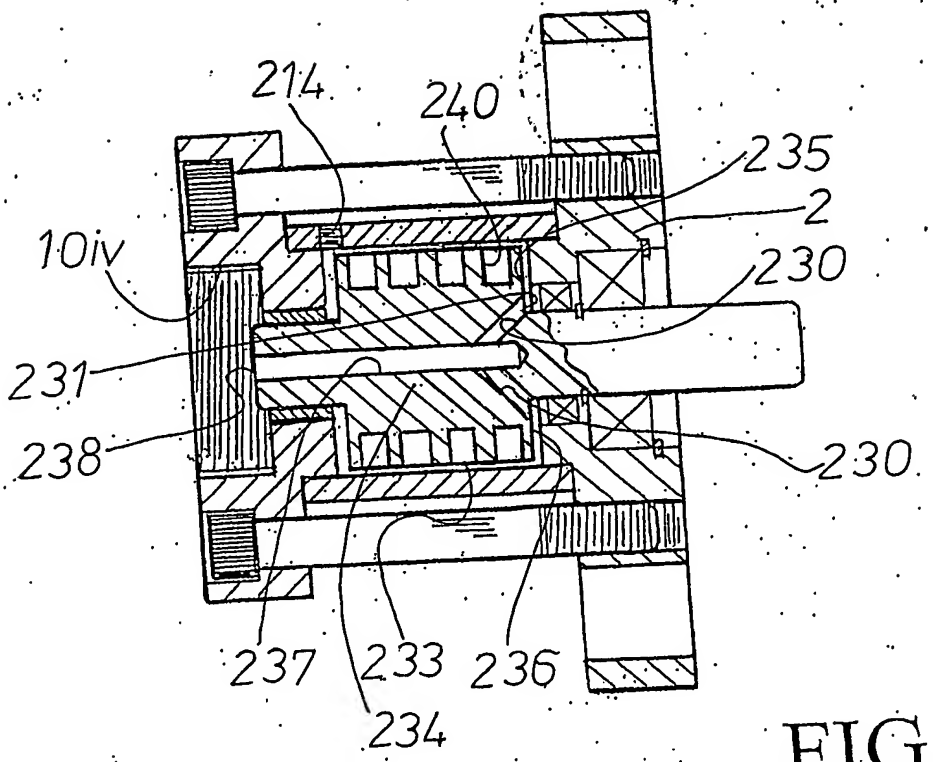
214
240
235
2
10iv
230
231
238
230
237
233
236
234

FIG. 26

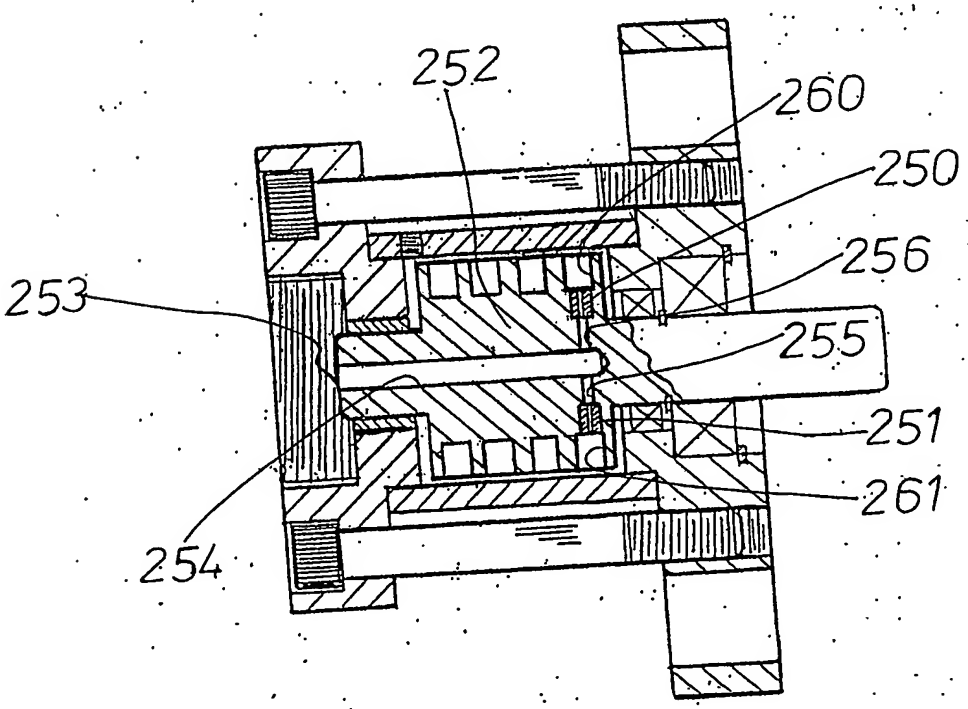
252
260
250
256
253
255
251
261
254

FIG. 27